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TONGWE NAMES OF MAMMALS: SPECIAL REFERENCE TO MAMMALS INHABITING THE KASOJE AREA, MAHALE MOUNTAINS, WESTERN TANZANIA

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ABSTRACT Indigenous knowledge is nowadays considered essential in regard to understanding and conservation of wildlife, especially where biological diversity is high. The Mahale region in western Tanzania is included in one of the biodiversity hotspots and also is a long-term field study site of chimpanzees and other wildlife. The Tongwe people are the area's original inhabitants, with rich traditional knowledge about wildlife. We collected Tongwe names of mammals and updated Jun'ichiro Itani's list, which was compiled about 40 years ago. We also provided information on updated scientific names, equivalent Swahili names, and the current existence of these mammals in Mahale. We listed 66 Tongwe names of mammals, excluding synonyms. Twenty-one names had synonyms of non-identical lexical origin. Among the 66 names, four are used collectively for multiple species, and some had subcategories. These collective names are mostly for smaller mammals like mice and bats. While most Tongwe names are of single primary lexemes, Swahili names are often compounded by adding adjectives to primary lexemes. From these outcomes, we discuss the several utilities of indigenous knowledge in the context of conservation activities, including environmental education of local youngsters.

Key Words: Tongwe language; Western Tanzania; Indigenous knowledge; Ethnozoology; Update of Itani's work.

INTRODUCTION

The Mahale Mountains National Park in Western Tanzania lies within the Eastern Afromontane biodiversity hotspot (Mittermeier et al., 2004). Biodiversity hotspots are defined as the biologically richest and yet most threatened places on Earth. The original inhabitants of the Mahale region, before it became a national park, are the Tongwe people, a Bantu-speaking people, and this study aims to compile the Tongwe names of mammals by updating information provided by Jun'ichiro Itani (1977a) about 40 years ago. Our compilation is further supplemented by revised information on Mahale mammals' existence, which we confirmed through direct observations or camera trap surveys.

We regard it as important to grasp such indigenous knowledge, especially in two senses: First, indigenous knowledge will help us understand the diversity of human recognition of nature and the diversity of relationships between humans and nature. As many scholars warn (e.g., Batibo, 2013), bio-cultural diversity is

rapidly decreasing in most African societies due to adoption of a Western-based lifestyle. Such a tendency may also be common to non-African tropical countries. As Ziembicki et al. (2013) summarized, indigenous people nowadays rely less on wild animals or plants than several decades ago, and as a result, "the retention of indigenous knowledge may become less relevant and less detailed." Even though modern science has become more and more dominant worldwide in the last few centuries, science and indigenous knowledge often have different underlying principles (Morgan, 2003), and we cannot easily say that scientific classification is the superior way to recognize nature (Yoon, 2009). Thus, recording knowledge of a variety of cultures before they disappear completely is crucial. Second, more and more scholars have begun to evaluate indigenous knowledge as actually useful for wildlife conservation practices (e.g., Gadgil et al., 1993; Mokuku & Mokuku, 2004; Alves, 2012; Sitati & Ipara, 2012; Ziembicki et al., 2013). Because indigenous people have been living with their local nature over generations, their knowledge may substitute time-consuming surveys by ecologists to grasp the current existence, distribution, or even chronological changes of relatively rare wildlife species.

In this paper, we presume vernacular names to be indigenous knowledge's primary and fundamental element. By grasping vernacular names of animals and plants, we can consider how local people dissect nature and categorize it. Utilization for material as well as non-material purposes, and other elements of indigenous knowledge may be deeply connected with such names. For example, the use of an animal species for a particular purpose in the traditional rituals (e.g., Kakeya, 1978) is not possible without identifying the species first by the vernacular name.

The Tongwe people

The Tongwe (‹Batongwe› or [Watongwe]: hereafter, we place Tongwe words in angle brackets, ‹ ›, and Swahili words in square brackets, [ ]) are slash and burn agriculturalists, who were originally distributed over a 20,000 km² area in the Kigoma and Mpanda Regions of Western Tanzania. According to the national census in 1967, the population was 21,120, and its density was 0.8 heads/km² (Kakeya, 1974). The people speak the Tongwe language (‹Sitongwe› or [Kitongwe]), one of the Bantu languages), but also are fluent in Swahili, a *lingua franca* widely spoken in Tanzania and other East African countries. Kakeya and Nishida (1976) compiled a preliminary glossary of the Tongwe language (the adjacent Bende language also shares much of the vocabulary with the Tongwe language: see Abe, 2006). As long as we are aware, no phonological and phonemic study has been conducted and there is no established orthography of the Tongwe language.

Jun'ichiro Itani, a Japanese primatologist and anthropologist who had been studying wild chimpanzees in Tanzania, first met the Tongwe in 1961. After that, he visited several Tongwe settlements during his extensive surveys. Consequently, he left detailed descriptions of the Tongwe's genealogy, hunting practices, belief

in spirits, perception of animals, and traditional curing rituals (Itani, 1977b). In 1965, one of Itani's postgraduate students, Toshisada Nishida, began long-term research on chimpanzees in the Kasoje Area on the shore of Lake Tanganyika and at the foot of the Mahale Mountains. At that time, several settlements of the Tongwe were still in the Kasoje Area, and the people were leading traditional lives. Although Nishida's initial purpose was to habituate chimpanzees there, he also became fascinated by the Tongwe's traditional way of living and thus left detailed descriptions about them (e.g., Nishida, 1973). Then, during 1971–1972, Makoto Kakeya visited and stayed in several Tongwe settlements where he began intensive anthropological research on Tongwe subsistence, culture, and traditional curing rituals (e.g., Kakeya, 1974, 1976). These studies clearly show that, although the Tongwe were farmers, they also depended heavily on wild animals and plants for subsistence.

Studies on the Tongwe's indigenous knowledge about living things

Since Nishida's arrival at Kasoje, a long-term research project on wild chimpanzees has been continued for more than 50 years (see Nakamura et al., 2015). The project has been employing resident Tongwe as research assistants, and their rich knowledge of wild plants and animals has been useful for academic research on chimpanzees. For example, because Tongwe names of plants mostly correspond with scientific species (Nishida & Uehara, 1981), both chimpanzee researchers and local assistants at Mahale have been using Tongwe names for chimpanzee food plants (Nakamura, 2015). Additionally, Tongwe traditional knowledge about medicinal plants was utilized when detecting medicinal plant usage by wild chimpanzees (Huffman, 2015).

Knowledge of wild animals other than chimpanzees has also been quite useful for researchers. At least while they were still living in the wilderness, the Tongwe possessed very detailed knowledge about wild animals. Itani, while doing his surveys on chimpanzees, collected more than 300 local names of animals and listed up to 275 in correspondence with scientific names (Itani, 1977a). This list contains 62 invertebrates, 58 fish (Itani excluded several fish names because of uncertain identification), 21 amphibians or reptiles, 73 birds, and 61 mammals. Among mammals, 57 Tongwe names corresponded one to one with scientific species. Itani (1977b) noted that only mice, bats, and moles were named collectively. The Tongwe's higher classification includes plants ‹libhwasi›, bugs ‹limujye› (including Mollusca, Annelida, Arthropoda, Amphibia, and Reptilia), fish ‹isembe›, birds ‹inyonyi›, and mammals ‹inywele› (but this includes some large reptiles) (Itani, 1977a); (the latter two are spelled ‹inyoni› and ‹inyuwele›, respectively, in Itani's paper: emphasis added).

Detailed classification of animals, especially mammals, to a specific level may be related to the Tongwe's various ways of hunting and utilizing wild animals. Itani (1977b) described 29 ways of hunting by the Tongwe (shooting with a gun, spearing, using a bow and arrow, various types of trapping, etc.), with information on target animals. The Tongwe were in no way merciful zoophiles, but through such various hunting methods, they had detailed knowledge about ani-

mals' behaviors and ecology. Furthermore, Kakeya (1978) described animals used in traditional medicine, rather for their symbolic meanings than for their medicinal components. From reasons the Tongwe used a particular animal for a particular purpose, we have also found that they were well aware of the animals' behaviors and habits. For example, they used chimpanzees' heads as anti-sorcery medicine ‹sindiko› (Kakeya, 1978). Their reasoning was "Because chimpanzees change their nests every day, even if a sorcerer tries to put curse on a house, he will change his mind and go away the next day" (Kakeya, 1978, our translation). From this description, evidently, the Tongwe knew that chimpanzees make beds (birds'-nest-like structures in trees where they sleep: see Zamma & Ihobe, 2015) every day in different places. Such knowledge probably was formed independent of scientific knowledge brought by foreign researchers.

Reasons for revision

There are several reasons to update Itani's (1977a) information on mammal names.

The first reason is the decline of knowledge of wild mammals, especially in younger generations of the Tongwe. A preliminary survey conducted in a Tongwe village near Mahale showed that many people over 40 years old could still call mammals by their Tongwe names, but a higher proportion of younger generations (below 30s), even when they knew the animals, were more likely to call them only by Swahili names (Nakamura, 2014). Additionally, when MN asked primary school children in the same village about local animals' names, they gave only 30% correct answers (either in Tongwe or Swahili). We know that some of the children's fathers are well aware of the Tongwe names of mammals. Thus, knowledge seems not to be passed on to the next generation. Therefore, while those generations who know animals are still alive, compiling the information is worthwhile.

Secondly, although Itani's (1977a) list is very detailed and useful, the paper is published in a Japanese book not easily accessible to international readers, including the Tongwe themselves. Because some young Tongwe people have a higher education, including the English language, and have access to Internet resources, compiling the information as an English paper available online would be useful.

Finally, information on mammalian fauna at Mahale has been updated recently (see Ihobe, 2015). This is largely due to camera-trap surveys recently conducted, mainly targeting leopards, but also recording various other species of mammals (Nakazawa, 2014; Otani, 2016). Furthermore, mammals' taxonomy has been largely revised from Itani's list: Some previous subspecies have now been updated to full species, and some scientific names have been changed. In addition to these, some mammalian species were incorrectly identified or totally overlooked by Itani.

In this paper, we focus only on mammals although Itani's (1977a) list was exhaustive—covering all the animal kingdom including non-mammalian species. Mammals are relatively easy to identify, if we have photographs, and easier to match one to one with Tongwe names. In addition, mammals more easily attract people's interest. They are popular among foreign tourists visiting Mahale, and

knowing mammals may be a good starting point for local children to take interest in the variety of living organisms. For such reasons, we limit our revision to mammals in this paper.

METHODS

The study was mainly conducted in the Kasoje Area in the Mahale Mountains National Park and in an adjacent village in Tanzania (Fig. 1). We collected mammals' names from Tongwe informants in the following ways. First, during his chimpanzee research since 1994, MN had been collecting the Tongwe and Swahili names of mammals from Tongwe assistants by asking them about animals whenever he encountered mammals in the Kasoje Forest. Second, MN also collected Tongwe names by showing assistants an illustrated guidebook of African mammals (e.g., Kingdon, 1997). Third, in 2013, MN and BRN conducted semi-structured interviews with 53 villagers (40 males and 13 females) in a village adjacent to Mahale. We showed pictures of 26 mammal species taken at Kasoje and asked the names both in Swahili and Tongwe. After this, sporadically through 2014 and 2015, we asked seven Tongwe informants (all males in their 40s to 60s who are working or did work as research assistants and are familiar with mammals) for clarifications of unfamiliar names or the animals' identities. Then we compiled the species list and compared it with that of Itani (1977a). When any inconsistencies occurred, we asked some of the seven informants for clarifications.

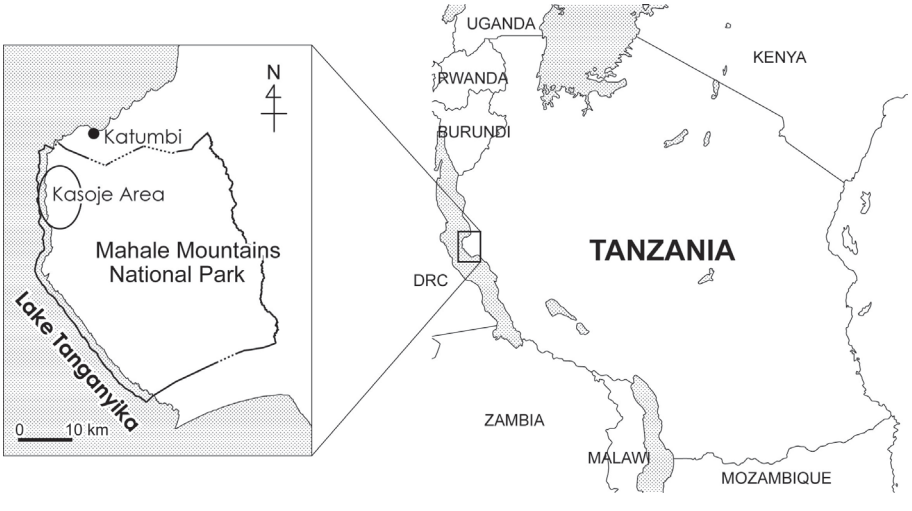

Fig. 1. A map showing the study area. Collection of mammal names and confirmation of mammals' existence are mainly done in the Kasoje Area (an oval) whereas semi-structured interview was conducted in the Katumbi Village (a black circle).

Beginning in 2012, NN set trap-cameras in the Kasoje Area, primarily to study leopards, but at the same time, to confirm mammalian species there. This information is used together with the literature to confirm scientific names of mammalian species existing at Kasoje.

We also modified the notational system of Tongwe names. For example, according to informants, some of the "g" and "b" consonants (such as in ‹inyaga› and ‹kabundi›) in Itani's (1977a) names may better be written as "gh" and "bh," respectively, to match natural pronunciations (thus, we write here ‹inyagha› and ‹kabhundi›). However, this rule does not apply when "g" or "b" is preceded by "m" (e.g., ‹mbubhu›). This modification was primarily done by NI when she interviewed the Tongwe names of plants (e.g., in Itoh et al., 2015; Itoh, in prep.). Finally as a native speaker of the Tongwe, BRN confirmed these changes.

RESULTS

There were 66 Tongwe names of mammals excluding synonyms (Table 1). Twenty-one names (31.8%) have synonyms that are not of the same lexical origin (i.e., not merely a slight change of prefixes; shown with daggers in the second column of Table 1). Most of these synonyms are from different locations within the Tongwe's range: The Tongwe people who used to live in higher mountain areas (people are no longer allowed to live in the national park area in the mountain) tended to use different names than people living at the lakeshore. There is no tendency that animals belonging to a particular mammal taxon have synonyms; rather, it seems that more common animals (based on our experiences) tend to have them.

Next, we look at the names in detail according to mammalian orders.

HYRACOIDEA

There are one Tongwe name and one or two species in this order. The name ‹npimbi› is primarily used for the bush hyrax (*Heterohyrax brucei*), the common hyrax species in Kasoje. Probably the name also includes the southern tree hyrax (*Dendrohyrax arboreus*) if the species really exists in this area. Former reports (e.g., Anonymous, 1980) listed this tree hyrax species, but recent surveys did not confirm its existence there. Possibly the species exists only outside Kasoje, as noted by Nishida (1990).

PROBOSCIDEA

We confirmed one name and one species, so there is no confusion. Although ‹nsofu›, the savanna elephant (*Loxodonta africana*), is not present at Kasoje, there have been reliable sightings (including dung) within Mahale (Zamma et al., 2015).

Table 1. List of Tongwe names for mammals

ORDER Tongwe name (plural[1])	Synonym[2] (plural[1])	English name[3]	Scientific name[3]	Standard Swahili name[4]	Local Swahili name	Recent observation at Kasoje
HYRACOIDEA						
npimbi (ma+)	(tumpimbi)	bush hyrax (and southern tree hyrax?)	*Heterohyrax brucei* (and *Dendrohyrax arboreus*?)	pimbi-madoa (and perere?)	pimbi	+
PROBOSCIDEA						
nsofu (ma+)	ighula (ma-)[5†]	savanna elephant, *African elephant	*Loxodonta africana*	tembo (ndovu)	tembo	-
MACROSCELIDEA						
isenje (ma-)	kasenje (tu-)	checkered elephant-shrew	*Rhynchocyon cirnei*	*njule madoa	N/A	+
TUBULIDENTATA						
inyagha (ma-)		aardvark	*Orycteropus afer*	mhanga	mhanga	+
PRIMATES						
mughanya (mi-)	(mamighanya), kamughanya (tu-), limughanya (ma-)	large-eared greater galago	*Otolemur crassicaudatus*	komba-masikio-makubwa	komba	+
kabhundi (tu-)		southern lesser galago (and dwarf galago?)	*Galago moholi* (and *Galagoides* sp.?)	komba-senegali	komba	-
nsima (-)	nkima (-)	mitis monkey, *blue monkey	*Cercopithecus mitis*	kima	kima	+
kasolima (tu-)	kakolo (tu-)[†]	red-tailed monkey	*Cercopithecus ascanius*	*kima-mkia-mwekundu	N/A	+
kajanda (tu-)	kakende (tu-)[5†]	vervet monkey	*Chlorocebus pygerythrus*	tumbili (ngedere)	tumbili	+
linguje (ma-)	linkonto (ma-)[5†], ikuku (ma-)[5†]	yellow baboon	*Papio cynocephalus*	nyani-njano	nyani	+
nkamba (-)	(ma+)	Angola black-and-white colobus	*Colobus angolensis*	mbega-mweupe-kusi	mbega	+
ndughulughu (-)	fuijo (ma+)[5†]	eastern red colobus	*Procolobus rufomitratus*	mbega-mwekundu	N/A	+
insoko (ma-)	linsoko (ma-), ntanda (-)(ma+)[†], ntanda-mkunyi (ma+)[†], ikuku (ma-)[5†]	chimpanzee	*Pan troglodytes*	sokwe mtu	sokwe/sokomtu	+

(Continued)

ORDER Tongwe name (plural[1])	Synonym[2] (plural[1])	English name[3]	Scientific name[3]	Standard Swahili name[4]	Local Swahili name	Recent observation at Kasoje
LAGOMORPHA						
kalulwe (tu-)	(tukalulwe), kabhonjo (tu-)[5†]	African savanna hare?	*Lepus victoriae*?	sungura	sungura	-
RODENTIA (and some shrew species of **SORICOMORPHA**)						
sifuko (fi-)	(-), (nfuko)	*silvery mole-rat?	**Heliophobius argenteocinereus*?	*fuko	fuko	-
muhale (mi-)	kamuhale (tu-)	red-legged sun squirrel?	*Heliosciurus rufobrachium*?	kindi-jua-kahawia?	N/A	+
kasemete (tu-)	kaselemete (tu-)	African giant squirrel?	*Protoxerus stangeri*?	kindi-mkubwa?	N/A	+
mbubhu (-)	(tumbubhu), kampata (tumipata)[5†]	giant-pouched rat, *giant forest rat	*Cricetomys gambianus*	buku	panya buku	+
nsensi (-)	(ma+), nsenji (-)	cane rat	*Thryonomys swinderianus*	ndezi-mkubwa	ndezi	+
ikoso (ma-)	kakoso (tu-)	mice, dormice, and shrews (collective)		*panya	panya	+
likabhende (ma-)	ikoso-likabhende (ma-)	common striped grass mouse?	*Lemniscomys striatus*?	*panya?	panya	-
limula (ma+)	(ma-), limulyansekesi (ma-)	brush-tailed porcupine	*Atherurus africanus*	*njiko	N/A	+
nyungwa (ma+)	njabhanyia (ma+)[5†]	Cape porcupine?	*Hystrix africaeaustralis*	nungunungu-kishungi	nunguli, nungunungu	+
CETARTIODACTYLA						
ngili (ma+)	njiri (ma+), nsatula (ma+)[5,6†], mpango (ma+)[5,7†]	common warthog	*Phacochoerus africanus*	ngiri	ngiri	+
ngulubhe (ma+)	jafunta mulomo (syafunta mulomo)[5,8†], kalale kwibhanja (ma+)[5,9†], kajimo (tu-)[†]	bushpig	*Potamochoerus larvatus*	nguruwe-mwitu	nguruwe	+
ngufu (ma+)	ntomombo (ma+)[5†]	common hippopotamus	*Hippopotamus amphibius*	kiboko	kiboko	+
kasanga (tu-)	likasanga (ma-)	giraffe	*Giraffa camelopardalis*	twiga	twiga	-
nsuja (-)	(ma+), isesa (ma-)[10†]	bushbuck	*Tragelaphus scriptus*	mbawala (pongo)	pongo	+
nsobhe (ma+)		sitatunga	*Tragelaphus spekii*	nzohe	?	-
ntandala (ma+)		greater kudu	*Tragelaphus strepsiceros*	tandala-mkubwa	?	-
nimba (ma+)		common eland	*Tragelaphus oryx*	pofu	?	-
nkolongo (ma+)		roan antelope	*Hippotragus equinus*	korongo	korongo	-

mpalapala (ma+)		sable antelope	*Hippotragus niger*	palahala (mbarapi)	?	-
kasiya (tu-)		bush duiker	*Sylvicapra grimmia*	nsya	nsya	-
kape (tu-)		blue duiker	*Philantomba monticola*	ndimba	N/A	+
nkoto (-)	(tunkoto)	Sharpe's grysbok?	*Raphicerus sharpei*?	dondoro?	?	-
sikinda (fi-)		klipspringer	*Oreotragus oreotragus*	mbuzi-mawe	mbuzi-mawe	-
mpweje (ma+)	nkumpa (ma+)[5†]	waterbuck	*Kobus ellipsiprymnus*	kuro	kuro	-
kakisi (tu-)		Lichtenstein's hartebeest	*Alcelaphus lichtensteinii*	konzi	kongoni	-
nyamela (ma+)		topi	*Damaliscus lunatus*	nyamera	?	-
mbogho (ma+)		African buffalo	*Syncerus caffer*	nyati (mbogo)	nyati	-
ng'ombe (-)[11]	(ma+)	*domestic cattle	**Bos taurus*	*ng'ombe	ng'ombe	-
ntama (-)	(ma+)	*domestic sheep	**Ovis aries*	*kondoo	kondo	-
mbusi (ma+)		*domestic goat	**Capra hircus*	*mbuzi	mbuzi	-
CHIROPTERA						
ilima (ma-)		fruit bats (collective)	Pteropodidae	*popo-matunda	popo	+
kafupe (tu-)	lifupe (ma-)	small bats (collective)		*popo-wadudu	popo	+
PERISSODACTYLA						
mbegha (ma+)		plains zebra	*Equus quagga*	punda milia	punda milia	-
mpela (ma+)		black rhinoceros	*Diceros bicornis*	faru	faru	-
PHOLIDOTA						
nkakakubhona (ma+)		giant pangolin	*Smutsia gigantea*	kakakuona	kakakuona	+
CARNIVORA						
likabhwa (ma-)	lighwalondo (ma-)[5†]	*domestic dog	**Canis lupus familiaris*	*mbwa	mbwa	-
limbwe (ma-)		side-striped jackal	*Canis adustus*	mbweha-miraba	mbweha	-
ibhinga (ma-)		African wild dog	*Lycaon pictus*	mbwa-mwitu	mbwa-mwitu	-
ikala (ma-)		mongoose (collective?)		nguchiro	mkala	+
ikala-malumbi (ma-)		bushy-tailed mongoose	*Bdeogale crassicauda*	nguchiro-kijivu	mkala	+
lijenjeghele (ma-)	ikala- lijenjeghele (ma-)	white-tailed mongoose	*Ichneumia albicauda*	nguchiro-mkia-mweupe	mkala	+
kakalamun'sio (tu-)	ikala-mun'sio (ma-)	dwarf mongoose	*Helogale parvula*	kitafe	mkala	+
nkonda (ma+)		African clawless otter	*Aonyx capensis*	fisi-maji	fisi-maji	+
kakonje (tu-)		spotted-necked otter	*Hydrictis maculicollis*	*fisi-maji koo-madoa	fisi-maji	-
sibhuli (fi-)	ghwalutwa nsinda (tughwaltwa nsinda)[5,12†]	honey badger, *ratel	*Mellivora capensis*	nyegere	N/A	+
kasimba (tu-)	munduli (mi-)[†]	genet	*Genetta* sp. or spp.	kanu-vichaka	kasimbasimba	+

(Continued)

ORDER Tongwe name (plural[1])	Synonym[2] (plural[1])	English name[3]	Scientific name[3]	Standard Swahili name[4]	Local Swahili name	Recent observation at Kasoje
likijanga (ma-)	ngwaniya bhukaka (ma+)[5†]	African civet	*Civettictis civetta*	fungo	fungo	+
itana (ma-)	(ma+), mughalalu (mi-)[5,13†]	spotted hyena	*Crocuta crocuta*	fisi-madoa	fisi	+
kanyaaghwi (tu-)		*domestic cat	**Felis silvestris catus*	nyaw	nyaw	-
ibhalabhala (ma-)		serval	*Leptailurus serval*	mondo	mondo	+
ngwe (-)	(ma+), nsubhi (ma+)[5†]	leopard	*Panthera pardus*	chui	chui	+
nsimba (-)	(ma+), ghwamikako (manyamikako)[5,14†]	lion	*Panthera leo*	simba	simba	-

1. Plurals are given in the following format: (ma-): *i-* (or *li-*) prefix in singular is replaced by *ma-* in plural, e.g., *i*senje–*ma*senje, *li*mula–*ma*mula. (fi-): *si-* prefix in singular is replaced by *fi-* in plural, e.g., *si*fuko–*fi*fuko (tu-): *ka-* prefix in singular is replaced by *tu-* in plural, e.g., *ka*fupe–*tu*fupe. (mi-): *mu-* prefix in singular is replaced by *mi-* in plural, e.g., *mu*ghanya–*mi*ghanya. (-): No change for plural, e.g., nsima–nsima. (ma+): prefix *ma-* is added to singular, e.g., nkakakubhona–*ma*nkakakubhona. Irregular plurals are given whole in parentheses.
2. There are slight variations in the names given by different informants (especially the noun class, i.e., which prefix to use is often inconsistent among them). We basically used the name listed in Itani (1977a) as the main entry, but included other name variants and synonyms in this column. Synonyms of non-identical lexical origin are shown with daggers.
3. Based on Foley et al. (2014). When there is no entry in this reference or when another name is commonly used, we supplemented the name with asterisks.
4. There are local dialects in Swahili. Here we applied the names in Mdee and Kiango (2008). When they did not list animals, we supplemented names that appear in other literature, or in dictionaries, with asterisks. It seems Mdee and Kiango (2008) created species names by adding modifiers with hyphen (thus, some species' names may not be commonly used among Swahili speaking people). Modifiers mean as follows: -vichaka (of bush), -kijivu (ash-colored), -mwekundu (red), -kishungi (toupee), -mwitu (forest), -madoa (spotted), -njano (yellow), -masikio-madogo (small-eared), -mkia-mweupe (white-tailed), and -jua-kahawia (coffee-colored sun).
5. Used in mountainous areas at Mahale.
6. Meaning the one who looks up and down.
7. Denoting the characteristic tusk.
8. Meaning the one digs the ground.
9. Meaning the one who comes soon after being chased away.
10. Isesa is used for males with good horns.
11. Probably an adopted word from Swahili.
12. Meaning the one who eats honey.
13. Meaning the one who eats bones.
14. Meaning the one who is fierce.

Fig. 2. An small animal known as ‹isenje›. We can identify it as a checkered elephant-shrew (*Rhynchocyon cirnei*) from the characteristic checkered pattern on the back and the long snout.

MACROSCELIDEA

This order was once included in the commonly used, but now abandoned, order Insectivora. One Tongwe name in this order exists. ‹Isenje› seems to denote specifically the checkered elephant-shrew (*Rhynchocyon cirnei*), which is easily distinguishable for both Tongwe and researchers from the characteristic checkered pattern on its back and long snout (Fig. 2).

TUBULIDENTATA

We confirmed one name and one species, and thus there is no confusion. Because ‹inyagha›, the aardvark (*Orycteropus afer*), is a nocturnal species, direct observation is rare, but the species is frequently confirmed by camera traps, and its carcass is sometimes observed in the Kasoje Area (Hosaka et al., 2014).

PRIMATES

There are nine names and nine or ten species of primates. Informants usually distinguish two kinds of galagos (larger and smaller) that correspond to ‹mughanya› and ‹kabhundi›, respectively. The larger ‹mughanya› matches the large-eared greater galago (*Otolemur crassicaudatus*), but the smaller ‹kabhundi› seems uncertain. This name seems to be used primarily for the southern lesser galago (*Galago moholi*). However, one recent report shows that the dwarf galago (*Galagoides* sp.) also exists at Mahale (Moyer, 2006). If this is the case, the name ‹kabhundi› probably includes these two smaller species of galagos without any distinction.

All diurnal primates are clearly distinguished and have names in Tongwe that correspond to scientific species. An exception may be the name ‹ikuku›, which is used in higher areas for both baboons and chimpanzees (but some say it is a name for baboons). Such a mixture of baboons and chimpanzees is also observed in Swahili. While [nyani] and [sokwe] literally mean “baboons” and “chimpanzees,” respectively, the two names are sometimes mistakenly used to denote both. Some informants say that ‹ikuku› is used in the Ha language (the Ha or [Waha] is an ethnic group originally located north of Tongwe, but nowadays, quite a number of Ha people live in villages near Mahale). One name added to Itani’s (1977a) list is ‹kasolima›. Itani (1977a) listed the red-tailed monkey as ‹kakolo› (but he also used the name ‹kasolima› elsewhere; Itani, 1970). The name ‹kakolo› is used in a higher area of Mahale, but in the lowland areas including Kasoje, informants usually call this species ‹kasolima›.

LAGOMORPHA

There is one name and probably one species. ‹Kalulwe› may be a general term to denote rabbits and hares. Itani (1977a) listed this as the cape hare (*Lepus capensis*), but later lists of mammals at Mahale (e.g., Nishida, 1990; Ihobe, 2015) completely lack Lagomorpha. However, informants clearly recognized ‹kalulwe›, which is equivalent to [sungura], a general Swahili term for hares and rabbits. Moyer (2006) also included the cape hare in his mammal list at Mahale. However, the African savanna hare (*Lepus victoriae*), instead of *L. capensis*, may be the likely candidate for this hare species because Foley et al. (2014) and Happold (2013) both showed that Mahale is included in the range of *L. victoriae*.

RODENTIA (AND SOME SORICOMORPHA)

There are nine names and many species. The Tongwe name ‹sifuko› and the Swahili name [fuko] seem to share the same lexical origin. Although [fuko] means “mole” in Swahili dictionaries (e.g., TUKI, 2001), there are actually no real moles (species belonging to Talpidae, Soricomorpha) in Africa (Happold & Happold, 2013). ‹Sifuko› was used solely for the mole-rat (*Heliophobius* sp. belonging to Rodentia) by Itani (1977a). Mahale is within the known range of the silvery mole-rat (*Heliophobius argenteocinereus*: only species in this genus) (Happold, 2013; Maree & Faulkes, 2016) although we could not obtain reliable sightings of this species at Mahale. According to our informants’ explanations, ‹sifuko› is a name for small, mouse-like mammals living underground, a bit smaller than the giant-pouched rat (*Cricetomys gambianus*). According to Nishida (1990), the mole-rat is absent at Kasoje, but found within Mahale.

Itani (1977a) listed only one name ‹muhale› for squirrels (identified as the African giant squirrel, *Protoxerus stangeri*). However, we obtained two names, ‹muhale› and ‹kasemete›. Some informants said ‹muhale› and ‹kasemete› were

synonymous (local dialects), but some said they denoted different species. According to the latter, ‹muhale› is a smaller species than ‹kasemete›. If this is true, among two species of squirrels (Ihobe, 2015), the red-legged sun squirrel (*Heliosciurus rufobrachium*) is ‹muhale›, and the African giant squirrel (*Protoxerus stangeri*) is ‹kasemete› because the head–body length of the former is 205–249 mm and of the latter, 270–306 mm (Happold, 2013). Probably more species of squirrels in Mahale have yet to be identified (Moyer, 2006).

‹Ikoso› is a collective term for small mammals such as mice, dormice, and shrews. There are three kinds of ‹ikoso›: ‹ikoso› (mouse in the house), ‹ikoso-kabheghe› (mouse in the forest), and ‹ikoso-likabhende›. The last one's subcategory name, ‹likabhende›, was also listed in Itani (1977a), but as moles (Talpidae, not as a subcategory of ‹ikoso›). As mentioned, no real moles inhabit Africa; thus Itani's classification seems incorrect. According to informants, ‹likabhende› is a kind of ‹ikoso›, but slightly larger (ca. 13 cm?) than normal ‹ikoso›, with a checkered or striped pattern on its back, and it walks on the forest floor. Such characteristics seem to correspond to the striped mice species (*Lemniscomys* spp.). Stanley (2004), who conducted a survey of small mammals at Mahale, listed two species in this genus, the common striped grass mouse (*L. striatus*) and the single-striped grass mouse (*L. rosalia)*. The range of the former, *L. striatus*, includes Mahale (Happold, 2013), and it has striped patterns on its back, so ‹likabhende› may denote this species.

The name ‹ikoso› may also include some species of shrews (Soricomorpha). Only two species are reported for this order (Ihobe, 2015), but because only a few surveys on small mammals have been conducted (Stanley, 2004), there may be more species of Soricomorpha at Mahale. Such small shrews, if they exist, may all collectively be called ‹ikoso›.

The larger porcupine is called ‹nyungwa› in Tongwe: This species had been regarded as the crested porcupine (*Hystrix cristata*) in some previous mammalian lists of Mahale. For example, Nishida (1990) listed *H. galeata* (synonym of *H. cristata*: Wilson & Reeder, 2005). According to Kingodon (1997), Mahale is an overlapping zone for the crested porcupine and another similar species, the cape porcupine (*Hystrix africaeaustralis*). These species resemble with each other, and the reliable way to distinguish them is to see the color pattern at the rump. Although we need more information to determine whether one or both species exist at Mahale, according to more recent distribution maps shown in Happold (2013) and Foley et al. (2014), the cape porcupine may be the more likely species, and Ihobe (2015) also employed this classification.

CETARTIODACTYLA

There are 21 names mostly corresponding to scientific species. Among these, some antelopes such as, ‹nsobhe› (the sitatunga, *Tragelaphus spekii*), ‹nimba› (the common eland, *Tragelaphus oryx*), ‹mpalapala› (the sable antelope, *Hippotragus niger*), and ‹kakisi› (the Lichtenstein's hartebeest, *Alcelaphus lichtensteinii*) have never been seen by informants because these animals are not present around

Mahale. Therefore, these animals are not listed for Mahale (Ihobe, 2015). Possibly, such species existed in the past.

There are some inconsistencies of identification with Itani's (1977a) list in regard to this order. He identified ‹kape› as the suni (*Nesotragus moschatus*) and ‹nkoto› as the blue duiker (*Philantomba monticola*) (but the latter with a question mark). However, all informants agreed that ‹kape› is the blue duiker. What ‹nkoto› really stands for is not clear, but according to informants, ‹nkoto› is larger than ‹kape› and about the same size as ‹kasiya› (=bush duiker: *Sylvicapra grimmia*) and has longer horns. It may denote the suni, but the species is not listed in the later mammal lists of Mahale (Nishida, 1990; Ihobe, 2015). A possibility is that ‹nkoto› denotes the Sharpe's grysbok (*Raphicerus sharpei*). While Hasegawa and Hiraiwa-Hasegawa (1980) were climbing Mt. Nkungwe, the highest peak at Mahale, they witnessed two small antelopes (a male and a female), apparently different from the blue duiker, at an altitude of 2,300 m and identified them as Sharpe's grysboks (but with a question mark). The accompanying Tongwe tracker told them that the animal was called ‹nkoto› in their language. As far as we are aware, this is the only report of the (possible) observation of the Sharpe's grysbok at Mahale, and we could not obtain further sighting information for this species.

CHIROPTERA

There are two Tongwe names (‹ilima› and ‹kafupe›), and many species of bats inhabit Mahale. Of these two names, Itani (1977a) listed only ‹ilima›. Actually, [popo] is the only Swahili word for bats. Thus Itani might have thought that ‹ilima› was equivalent to Swahili [popo]. However, Tongwe informants clearly distinguished two kinds of bats, i.e., the larger fruit-eating ‹ilima› and the smaller insect-eating ‹kafupe›. Both names seem to be used collectively rather than to denote a particular species. Ihobe (2015) listed two species of fruit bats (*Epomophorus* sp. and *Epomops franqueti*) and three species of other bats (belonging to Emballonuridae and Vespertilionidae), but there should be more species, especially small bats, yet to be identified.

PERISSODACTYLA

There are two names and two species and thus no confusion. ‹Mpela› (the black rhinoceros: *Diceros bicornis*) is already extinct in the area and thus is not listed in the mammal list of Mahale (Ihobe, 2015).

PHOLIDOTA

There is one name and one species. One large correction on the side of researchers is the species identification for the animal called ‹nkakakubhona› at Mahale.

Fig. 3. An animal known as ‹nkakakubhona›. From the number of scales on the back and quadrapedal locomotion, we identify this as a giant pangolin (*Smutsia gigantea*).

Although Itani (1977a) and following researchers (e.g., Nishida, 1990; Nishida et al., 2002) had long listed the cape (or savanna) pangolin (*Manis temminckii*, recently *Smutsia temminckii*), our camera-trap surveys confirmed only the existence of the giant pangolin (*Smutsia gigantea*) in this area (Fig. 3). Another survey also confirmed only the giant pangolin (Moyer, 2006). When we checked an old photograph of a pangolin at Mahale (in Itani et al., 1973), it also looked like a giant pangolin. Thus, the former scientific name was likely based on misidentification.

CARNIVORA

There are 13 names excluding ‹ikala› (a collective name for mongoose species with subcategories; see below). Larger carnivores (such as lions or leopards) usually have specific names without any ambiguity.

According to Itani (1977a), ‹kasimba› denotes just one species, the common genet (*Genetta genetta*). He listed just one species of genets, but later researchers at Mahale (e.g., Nishida, 1990) listed two species of genets, *G. genetta* and *G. tigrina* (the large-spotted genet). Therefore, ‹kasimba› may collectively denote *Genetta* spp. Still, recent classification updates of this genus make it difficult to determine which species actually exist at Mahale. According to the range map in Foley et al. (2014), Mahale is quite far from the known range of *G. genetta*. Therefore, it might be a misidentification of a different species. Yet possibly, this species actually exists: First, some individuals we observed had smaller spots on their fur than others, similar to the common genet's characteristics. Second, unlike Foley et al.'s (2014) distribution map, Kingdon and Hoffmann's (2013) distribution area for common genets is quite close to Mahale. We need a specialist for correct identification. Another scientific name listed by Nishida (1990), *G. tigrina*, is now used solely for a species endemic to South Africa (thus called the Cape

Fig. 4. A small cat-like animal known as ‹kasimba›. With large spots on the fur, we assume this individual animal to be the large-spotted genet (*Genetta maculata*).

genet), and the large-spotted genet living in East Africa is now classified as *G. maculata*. Many photographs of genets taken by camera traps show large spots on their fur (Fig. 4); thus, we are more confident in saying that this species occurs at Mahale. [Kanu] is commonly used for genets in standard Swahili (the name even appears in a dictionary), but the name is seldom heard around Mahale.

‹Ibhalabhala› is another confusing Tongwe name. Itani (1977a) wrote that the wild cat (*Felis lybica*, recently *F. sylvestris*) was ‹ibhalabhala›. However, all descriptions from our informants (e.g., having leopard-like spots on the fur, but smaller than the leopard) agree that ‹ibhalabhala› is the serval (*Leptailurus serval*). Itani (1977a) did not list the serval, but later studies (e.g., Nishida et al., 1979) listed the species. We also confirmed the existence of the serval in the Kasoje Area through our survey. Probably based on Itani's identification of ‹ibhalabhala› as the wild cat, Mahale researchers have continuously listed the wild cat in the list of mammals (e.g., Ihobe, 2015). However, recent camera traps have so far not detected this species, and we could not obtain reliable sighting information of the wild cat in Mahale even from interviews with informants. Thus, although Mahale is included in the known range of the wild cat (Kingdon & Hoffmann, 2013), we are not confident that the wild cat really exists at Mahale.

‹Ikala› is a general term for mongooses. Strangely, Itani (1977a) did not list any mongoose species, although he should have known the existence of mongooses because he mentioned "[nguchiro] (mongoose)" in a different book (Itani, 1977b). ‹Ikala› is primarily used for the white-tailed mongoose (*Ichneumia albicauda*: the largest mongoose species in the area), but some people say it is the banded mongoose (*Mungos mungo*: the most commonly seen mongoose species in Tanzania). The term [nguchiro] may be used collectively to refer to mongoose species, typically the banded mongoose, in standard Swahili, but it is not generally used around Mahale. Most Tongwe informants say that [mkala] is the Swahili equivalent for ‹ikala›.

Unlike most other mammal names, ‹ikala› has subcategories, ‹ikala-malumbi›, ‹(ikala-) lijenjeghele›, and ‹kakalamun'sio› (or ‹ikala-mun'sio›, with the ka- prefix, which is often used for small things). Among these, the former two correspond to the larger two species of mongoose, the bushy-tailed mongoose (*Bdeogale crassicauda*) and the white-tailed mongoose respectively, and thus were clearly distinguished by informants. For the largest white-tailed mongoose, people commonly say just ‹ikala›, but when asked to specify the kind, they answer ‹lijenjeghele›. Probably, following this classification (i.e., three names for mongooses), Nishida (1990) listed only three species of mongooses, namely bushy-tailed, white-tailed, and banded mongooses. However, the name ‹kakalamun'sio› is somewhat uncertain. Although, Itani (1977a) listed the equivalent name as the zorilla (*Ictonyx striatus*) and Mahale is within the range of the species (Kingdon & Hoffmann, 2013; Foley et al., 2014), no zorillas have been confirmed in the Kasoje Area to date (however, zorillas may occur outside Kasoje). We assume that the ‹kakalamun'sio› denotes primarily the dwarf mongoose (*Helogale parvula*) as this name is based on their vocalization "sio… sio." It is the most common species of diurnal mongooses, and we sometimes encountered a group of dwarf mongooses while walking in the Kasoje Forest. As they notice us, they tend to emit an alarm call, heard as "sio… sio." ‹Kakalamun'sio› may also include another small mongoose (but slightly larger than the dwarf mongoose), the banded mongoose. Although some informants recognize that there is a small diurnal mongoose with bands on the back, apart from the dwarf mongoose, they did not say a particular name for it, but "a kind of ‹ikala›."

In addition to the four species mentioned above, our camera trap survey confirmed another two species of mongooses, likely to be the marsh mongoose (*Atilax paludinosus*) and the slender mongoose (*Herpestes sanguineus*).

DISCUSSION

Among 66 Tongwe names we have collected, four names ‹ikoso›, ‹ilima›, ‹kafupe›, and ‹ikala› are used collectively for multiple species. Only ‹ikala› has clear subcategories, but ‹ikoso› also seems to have a few subcategories. Some names such as ‹kabhundi› (small galagos) and ‹kasimba› (genets) may correspond to two species each, but this is still tentative because we could confirm only one species, and the existence of the other was merely suggested. These names referring to multiple mammal species are mostly used for relatively small mammals, such as mice and bats. Such a tendency to name small mammals collectively is also seen in many other cultures: As Ziembicki et al. (2013) noted that, "[S]cientific taxonomy may poorly match …(snip)… particularly for small mammal groups that have little cultural importance."

We found in several cases that the animal species exists, but without a corresponding Tongwe name. For example, the banded mongoose seems clearly distinguished from others by the characteristic pattern on its back, but the Tongwe seem to have no specific name or even a subcategory name for it. One possibility is that particular Tongwe names for such animals existed previously,

but they have now been lost from their vocabulary. Another possibility is that they were not distinguished by names: The banded mongoose is included together with the dwarf mongoose in the category of ‹kakalamun'sio›.

The Tongwe and their language have a tendency to distinguish similar mammals based on size, e.g., ‹ilima›–‹kafupe› (bats), ‹nkonda›–‹kakonje› (otters), and ‹mughanya›–‹kabhundi› (galagos).

Updates to Itani's list of mammals

Itani's (1977a) original list contains two apparent misidentifications. One is ‹ibhalabhala›, which he identified as the wild cat, but from the description of informants, clearly this Tongwe name denotes the serval. Another is ‹likabhende›, which Itani assumed to be moles (collective). However, because no moles exist in Africa, this was a misidentification.

We also collected several synonyms that Itani (1977a) did not mention, such as ‹kasolima›, ‹nsatula›, and ‹ntanda›. Among these, we mention ‹kasolima›, the red-tailed monkey. Like ours, Itani's (1977a) intensive survey was conducted in the Kasoje Area, but he somehow listed the name ‹kakolo› for the monkey species. The name ‹kakolo›, informants say, is the one used in the higher mountain areas and ‹kasolima› is the commonly used name in the Kasoje Area. Thus, it is puzzling why Itani listed the name ‹kakolo› for this species.

Another puzzling thing is that he did not list even a single species of mongoose. There are at least four, and probably six mongoose species, collectively called ‹ikala›, and we confirmed three subcategory names ‹(ikala-)lijenjeghele›, ‹ikala-malumbi›, and ‹kakalamun'sio›.

We could also add the name ‹kafupe› for smaller bats which Itani (1977a) included in ‹ilima›. Our study showed that ‹ilima› denotes larger fruit bats and ‹kafupe› denotes smaller insectivore bats.

Comparison with Swahili names

Younger Tanzanian people, even when they know the animals, often use equivalent Swahili names (Batibo, 2013; Nakamura, 2014), about which there are some concerns. For example, there were formerly no corresponding Swahili names for several species. Some Swahili names in Table 1 seem to be literally translated from English names by Tanzanian scholars. Such names are often in the form of a primary lexeme with adjective(s). One example is [mbega-mwekundu]: [mbega] primarily means the Guereza black-and-white colobus (*Colobus guereza*) that inhabits Northern Tanzania, but not Mahale. Probably in Swahili, this word might have been generalized to denote all colobus species as a kind. As [mwekundu] means "red," [mbega-mwekundu] means red colobus. Such compound names are not so often used in Tanzanians' daily conversation. Actually, we never heard this [mbega-mwekundu] even when we asked the Swahili name for the red colobus. Tongwe people use the Swahili term [mbega] to denote the Angola black-and-white colobus (note this is a different species from the Guereza black-and-white colobus), but never for the red colobus. They just answer that there is no equiv-

alent name in Swahili. Thus, we may assume that except for such a compound name, there is no corresponding Swahili name for the red colobus. Completion of "standard" Swahili is often made in large cities such as Dar es Salaam or Arusha. Guereza black-and-white colobus is easily seen in the national parks near Arusha, while eastern red colobus is not. Thus linguists may tacitly assume [mbega] as the prototype for colobus in general.

In contrast to many Swahili names being compounded, most Tongwe names are composed only of primary lexemes. Exceptions are subcategories of ‹ikala› and ‹ikoso›. This abundance of names with primary lexemes may show how these mammals are familiar and deeply related to Tongwe life. In relation to this, names in standard Swahili are usually very complex, long, and artificial. For example, a Swahili name for the greater galago [komba-masikio-makubwa] seems overly complicated compared to the Tongwe equivalent ‹mughanya›. It is also more natural for people living where the species exists to call the animal by its local name.

Although we tend to think that scientific knowledge is better than indigenous knowledge, our results showed that this is not always true. For example, researchers had misidentified even such a large mammal as the giant pangolin as a different species until recently and even repeatedly listed it in scientific papers. This incorrectness is purely on the researchers' side because local people correctly and consistently denote the species as ‹nkakakubhona›. Thus we should bear in mind that even what scientists believe to exist in a particular area based on scientific literature may sometimes be misidentification of a different species, and that local terminology and knowledge sometimes works better to update scientific knowledge.

Indigenous knowledge for effective conservation

Nowadays, establishing wildlife conservation policies without local people's involvement and consideration of the relationships between them and the wildlife is not appropriate (Alves, 2012). For example, it is sometimes difficult for local people to talk about local animals with their exotic names (such as English or scientific names). If we conduct conservation activities with only such names, the local people, except for those who can afford westernized higher education, may feel excluded from such activities. Alternatively, if we use traditional names of animals and plants in the activities of conservation, local people may recognize their rich cultural knowledge about nature and feel proud of protecting it.

Detailed ecological knowledge is best conceptualized and more thoroughly expressed in the local vernacular (reviewed in Ziembicki et al., 2013), and we believe using such knowledge is a good starting point for local youngsters to learn about their natural environment. As Batibo (2013) noted, many African countries are struggling to preserve their biodiversity on the one hand and to make indigenous knowledge accessible to younger generations on the other. We hope records accumulated by zoologists like us and traditional information from local people will be combined to facilitate conservation of both cultural knowledge and wildlife.

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